BAB 5
SIMPULAN

5.1. Simpulan

Polimer karbopol 940 dan HPMC K4M dapat digunakan sebagai kombinasi matriks tablet *bukoadhesif* atenolol yang memiliki pengaruh terhadap indeks pengembangan, lama perekatan, pH permukaan, dan pelepasan secara *in-vitro*. Karbopol 940 seperti yang diketahui berdasarkan penelitian dapat menirunkan indeks pengembangan, pH permukaan, dan pelepasan secara *in-vitro*, serta dapat meningkatkan lama perekatan dari tablet *bukoadhesif* atenolol. Sedangkan HPMC K4M berdasarkan penelitian diketahui dapat menurunkan lama perekatan dan meningkatkan indeks pengembangan, pH permukaan, dan pelepasan secara *in-vitro* dari tablet *bukoadhesif* atenolol. Untuk interaksi dari kedua matriks tersebut yaitu Karbopol 940 dan HPMC K4M memberikan pengaruh dapat meningkatkan lama perekatan tablet *bukoadhesif* serta dapat menurunkan pH permukaan, indeks pengembangan dan pelepasan secara *in-vitro* dari tablet *bukoadhesif* atenolol.

Formula optimum dari tablet bukoadhesif atenolol dapat diperoleh dengan konsentrasi Karbopol 940 1% dan HPMC K4M 25% akan menghasilkan tablet bukoadhesif dengan respon pH permukaan 6,4, respon indeks pengembangan 131,67 , respon lama merekat 6 jam dan respon uji pelepasan secara *in vitro* 684,647 $\mu g/cm^2$/jam.

5.2. Alur Penelitian Selanjutnya

Dilakukan pembuktian terhadap beberapa formula optimum terpilih yang mempunyai konsentrasi lebih rendah, kemudian dibandingkan

hasilnya secara teoritis. Selain itu juga dilakukan penelitin terhadap penetrasi tablet *bukoadhesif* atenolol.

DAFTAR PUSTAKA

Adhikari S. N. R., B. S. Nayak, A. K. Nayak, and B. Mohanty, 2010, Formulation and Evaluation of Buccal Patches for Delivery of Atenolol, **AAPS PharmSciTech**, 11(3), 1038-1044.

Ahuja, A., Khar, K. R., Ali, J,. 1997, Mucoadhesive Drug Delivery System, **Drug Dev. Ind Pharm**, 23 (5), p. 489-575.

Anonim, 2007, **US Pharmacopeia XXX**, US Pharmacopeial Convention,Inc., Rockville, 680.

Anonim, 1979, **Farmakope Indonesia**, Jakarta, Departemen Kesehatan Republik Indonesia, 6-8, 15.

Anonim, 1995, **Farmakope Indonesia**, Jakarta, Departemen Kesehatan Republik Indonesia, 4-6, 113-116.

Anonim, 2005, PermeGear Franz Cells [Online], PermeaGear, Available: http://www.permegear.com/franz.htm[Accessed 11 Januari 2012].

Ansel H.C., 1989, **Pengantar Bentuk Sediaan Farmasi**, 4th ed., Universitas Indonesia, Jakarta, 249;313.

Bernkop-Schnürch, A., 2002, Mucoadhesive Polymers, In: Polymeric Biomaterials, Dumitiru, S., 2nd Edition, Marcel Dekker Inc., New York, 147-152.

Bhalodia, R., Basu, B., Garala, K., Joshi, B. and Mehta, K., 2010, Buccoadhesive Drug Delivery System, **International Journal of Pharma and Bio Sciences**, 1(2), 1-21.

Batheja P., R. Thakur, and B. Michniak, 2007, Basic Biopharmaceutics of Buccal and Sublingual Absorption, in: **Enhancement in Drug Delivery**, E. Toitou and B. W. Barry (Eds.), Taylor & Francis Group, LLC., Boca Raton, 179-182.

Bolton, S., 1990, **Pharmaceutical Statistic: Practical and Clinical Applications**, 2nd ed., Marcel Dekker, Inc., New York, 324-427.

Chandrashekar, N. S. and Rani, R. H. S., 2008, Physicochemical and Pharmacokinetic Parameters In Drug Selection and Loading for Transdermal Drug Delivery, **Indian Journal of Pharmaceutical Sciences**,

70, 94-96.

Chary, R. B., Vani, G., Rao, Y. M., 1999, In vitro and In vivo Adhesion testing of Muchoadhesive Drug Delivery Systems, Entrez Pubmed., http://www.ncbi.nlm.nih.gov/entrez/query.fcgi/db=PubMed, 21-9-2005.

Chittchang M.,N. S. Miller, and T. P. Johnston, 2005, The Use of Mucoadhesive Polymers in Buccal Drug Delivery, **Advanced Drug Delivery Reviews**, 57, 1666– 1691.

Dhawan, S., Singla, A. K. And Sinsha, V. R., 2004, Evaluation of Mucoadhesive Properties of Chitosan Microspheres Prepared by Different Methods, **AAPS Pharm. Sci. Tech.**, 5(4), 67.

Derle, D., Joshi, O., Pawar, A., Patel., J. And Jagadale, A., 2009, Formulation and Evaluation of Buccoadhesive Bi-Layer Tablet of Propranolol Hydrochloride, **International Journal of Pharmacy and Pharmaceutical Sciences**, 2, 206-212.

Deshmane,S.V., M.A. Channawar,A.V. Chandewar,U.M. Joshi, amd K.R. Biyani, 2009, Chitosan Based Sustained Release Mucoadhesive Buccal Patches Containing Verapamil HCL, **Int.J.Pharm. And Pharmac. Sci.,** 1.

Emami, J., Varhosaz J., Saljhougian N., 2008, Development and Evaluation of Controlled-Release Buccoadhesive Verapamil Hydrochloride, **DARU**, 16(2), 60-69.

Duchene, D., Touchard, F., Peppas, N. A., 1988, Pharmaceutical and Medical Aspects of Bioadhesive Systems for Drug Administration, **Drug Dev. Ind Pharm**, 14 (2 & 3), p. 283-316

Green, J.M., 1996, A Practical Guide to Analytical Method Validation,in: **Analytical Chemistry**,23.

Hadisoewignyo, L. and Pratiwi, M., 2010, Optimasi Formula Tablet Lepas Lambat Kaptopril Menggunakan Metode Desain Faktorial, **Majalah Farmasi Indonesia**, 21 (4), 285–295.

JastiB. R., V.Marasanapalle, and X. Li, 2005, Modulation of Oral Transmucosal Permeability:Permeation Enhancers, in: **Drug Delivery to the Oral Cavity**, T. K. Ghosh and W. R. Pfister (Eds.), Taylor & Francis Group, LLC.,Boca Raton,72-74.

John, A. S., Satesh B. P. R., Goli D., Manoj, K. J., Kapil, K. P., 2010, Development and Evaluation of Buccoadhessive Drug Delivery System for Atorvastatin Calcium, **Journal of Curret Pharmaceutical Research**, (1), 31-38.

Kharenko, E.A., N.I. Larionova, and N.B. Demina, 2009, Muccoadhesive Drug Delivery Systems (Review), **Pharmaceutical Chemistry Journal**, 43(4), 21-29.

Kibbe, H., 2000, **Handbook of Pharmaceutical Exipients**, 3rd ed., London : The Pharmaceutical Press, p. 252-254, 465-466.

Lachman, L., Lieberman, H. A. and Kanig, J. L., 1989, Jakarta, UI-Press, 138-210.

Langoth, N., Kalbe, J., Bernkop-Schnürch, A., 2003, Development of Bucal Drug Delyvery Systems Based on a Thoilated Polymer, *Int. J. Pharm.,* **252**: 141-148.

Majid F. C. N., 2009, **Formulasi Patch Mukoadhesif Propanolol Hidroklorida: Pengaruh Perbandingan Konsentrasi Natrium Karboksimetilselulosa dan Polivinil Pirolidon Terhadap Sifat Fisik Patch dan Pelepasan Obat**, Skripsi Sarjana, Fakultas Farmasi, Universitas Muhamadiyah Surakarta, 3.

Martin A., J. Swarbrick, dan A. Cammarata, 2008,**Farmasi Fisik : farmasi fisik dalam ilmu farmasetik**, ed. 3, vol. 2, terjemahan Yoshita,Penerbit UI-Press, Jakarta, 827-844.

Mortazavi S. A. and R. Aboovazeli, 2000, Preparation and In Vitro Assessment of Various Mukosa-Adhesive Film for Buccal Delivery, **DARU**, 8(1), 9-10.

Nafrialdi, 2007, Antihipertensi, dalam: **Farmakologi dan Terapi**, ed. 5, S. G. Gunawan, R. Setiabudy, Nafrialdi, dan Elysabeth (Eds.), Departemen Farmakologi dan Terapeutik Fakultas Kedokteran Universitas Indonesia , Jakarta, 346-347.

Nasrin, N., Asaduzzaman, M., Mowla, R., Rizwan, F. and Alam, A. A., 2011, A comparative study of physical parameters of selected ketorolac tromethamine tablets available in the pharma market of Bangladesh, **Journal of Applied Pharmaceutical Science**, 01 (08)**,** 101-103.

Patel, V. F., Liu, F., Brown, M .B, 2006. School of Pharmacy, University of Hertfordshire,Hatfield, UK AL10 9AB., MedPharm Limited, Guilford, Surrey, UK GU2 7YN

Patel V. M., B. G. Prajapati, and M. M. Patel, 2007, Formulation Evaluation and Comparison of Bilayered and Multilayered Mucoadhesive Buccal Devices of Propanolol Hydrochloride, **AAPS PharmSciTech**, 8 (1), E3.

PfisterW. R.and T. K. Ghosh, 2005, Intraoral Delivery Systems, in: **Drug Delivery to the Oral Cavity**, T. K. Ghosh and W. R. Pfister (Eds.), Taylor & Francis Group, LLC.,Boca Raton, 4-8.

Pharmaceutical Press, 2007, **Martindale The Complete Drug Reference**, 35th ed., S. C.Sweetman (Ed.), Pharmaceutical Press, London, 1903.

Rowe R. C., P. J. Sheskey, and S. C. Owen, 2006, **Handbook of Pharmaceutical Excipients, 5th ed.**, The Pharmaceutical Press, London, 111, 301-302.

Rowe R. C., P. J. Sheskey, and S. C. Owen, 2009, **Handbook of Pharmaceutical Excipients, 6th ed.**, The Pharmaceutical Press, London, 111, 424-425.

Satishbabu B. K. and B. P. Srinivasan, 2010, Preparation and Evaluation of Buccoadhesive Films of Atenolol,**Indian Journal of Pharmaceutical Sciences**, 70(2), 175-179.

Setiawati A . dan S. G. Gunawan, 2007, Penghambat Adrenergik, dalam: **Farmakologi dan Terapi**, ed. 5, S. G. Gunawan, R. Setiabudy, Nafrialdi, dan Elysabeth (Eds.), Departemen Farmakologi dan Terapeutik Fakultas Kedokteran Universitas Indonesia , Jakarta, 94-95

Shin S. C. and J. Y. Kim, 2000, Enhanced Permeation of Triamcinolone Acetonide Through the Buccal Mukosa, **EJPB**, 50, 217-220.

Shojaei, A. H., 1998, Buccal Mucosa As A Route For Systemic Drug Delivery, **J Pharm. Pharmaceutical Sci.***,* 1 (1), 15-30.

Shirsand, S. B., P. V. Swamy, G. G. Keshavsetti, 2011, Design and Evaluation of Atenolol Bilayer Buccal Tablets, **RGUHS Journal of Pharmaceutical Sciences**, (1), 4-10.

Shivanand, S, N., A, R. S. and B, J., 2011, In vivo bioavailability studies of sumatriptan succinate buccal tablets, **DARU***,* 19.

Siregar, Charles J.P., 2010, **Teknologi Farmasi Sediaan Tablet Dasar-Dasar Praktis**,Jakarta, 27-36, 196-198.

Sutriyo, D. J., dan Indah, R., 2005, Perbandingan Pelepasan Propranolol Hidroklorida dari Matriks Kitosan, Etil Selulosa (EC), dan Hidroksi Propil Metil Selulosa (HPMC), **Majalah Ilmu Kefarmasian**, 2 (3), 145-153.

Tjay T.H dan K. Rahardja, 2007, **Obat-Obat penting**, 6th ed., Elex Media Komputindo, Jakarta, 551.

Velmurugan, S., Raju, K. N., Deepika, B. and Vinushitha, S., 2011, Formulation and In-vitro Evaluation of Buccal Tablets of Metoprolol Tartrate, **International Journal of Pharmacy and Pharmaceutical Sciences**, 3, 23.

Vogelpoel, H., Welink, J., Amidon, G. L., Junginger, H. E., Midha, K. K., Moller, H., Olling, M., Shah, V. P. and Barends, D. M., 2004, Biowaiver Monographs for Immediate Release Solid Oral Dossage Forms Based on Biopharmaceutical Classification System (BCS) Literature Data : Verapamil Hydrochloride, Propanolol Hydrochloride, and Atenolol, **Journal of Pharmaceutical Sciences**, 93 (8), 1945-1956.

Voigt, R., 1995, **Buku Pelajaran Teknologi Farmasi**, Yogyakarta, Gajah Mada University Press.

Wagner J.G., 1971, **Biopharmaceutics and Relevant Pharmacokinetics**, 1st ed., Drug Intelligence Publications, Illinois, 64-110.

Wells, J. L., 1993, **Pharmaceutical Preformulations: The Physicochemical Properties of Drug Subtance**, London, Ellis Horwood Limited, 209-214.

Williams, A., 2003, **Transdermal and Topical Drug Delivery**, The Pharm. Press, London, 42-44.

Winek, C. L., 2001, **Winek's Drug & Chemical Blood Level Data** 18.